Vapor Intrusion

Arizona Department of Environmental Quality

What is Vapor Intrusion?

Vapor intrusion is the general term given to the movement of volatile chemicals from subsurface contaminated soils and groundwater into the indoor air spaces of overlying buildings through openings in the building foundation (for example cracks, and utility conduits).

What chemicals pose a Vapor Intrusion risk?

The most common chemical sources are volatile organic compounds (VOCs) like:

- Tetrachloroethene (PCE) - used by dry cleaners
- Trichloroethene (TCE) - used as a degreaser
- Carbon tetrachloride - used as a spot remover
- Naphthalene - used in mothballs
- Benzene, toluene, ethylbenzene, and xylenes (BTEX) - found in gasoline and oil.

Common Contaminants of concern

VOC	Indoor Air Screening Level (µg/m³)	Background Levels for U.S.* (µg/m³)	Background Levels for Phoenix ** (µg/m³)
PCE	9.4	<0.03-2.2	<0.18-1.43
TCE	0.43	<0.02-1.1	<0.09-0.42
Benzene	0.31	<0.05-4.7	<0.38-2.79
Naphthalene	0.072	<0.40-0.47	not applicable

*Range median (USEPA 2011)
**Range 2005 annual mean
µg/m³: micrograms per cubic meter

Why is this is a concern?

Vapors emitted from subsurface contaminated soil or groundwater can enter buildings if vapor intrusion is occurring.

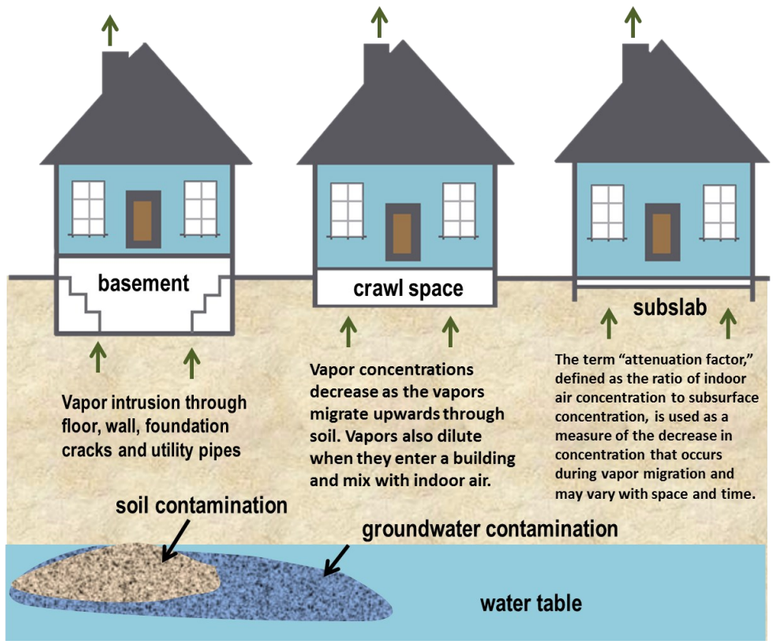
These vapors may contain organic compounds that may pose a potential long-term risk to the health of residents, workers, and other building occupants through inhalation of indoor air.

Evaluation

Multiple lines of evidence are used to determine if vapor intrusion is occurring. This can be done through the study of the source of contaminants (dry cleaner, gas station, for example) and sampling and evaluating:

- Indoor air
- Subslab, crawl space, or soil vapor
- Groundwater
- Ambient air inside and outside the home
- Building construction and utility conduits
- Site geology and history

The first step in a vapor intrusion evaluation is to compare results of environmental sampling to health-based screening levels to identify if a more thorough evaluation is needed.



Vapor Intrusion Pathway

Mitigation

If an unacceptable risk has been shown to exist, short-term measures that can be implemented including:

- Sealing cracks and openings in foundation
- Ventilating the living space
- Sealing the basement
- Installing an activated carbon –filtration system
- Relocating occupants

Long-term methods to reduce indoor concentrations of soil vapor contaminants can include the installation of ventilation and pressurization systems.

Reducing or eliminating the source of the contamination in soil and/or groundwater will ultimately reduce the potential for vapor intrusion and the need for mitigation measures.